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ABSTRACT

While most efforts in programing for learning disabled adolescents have been directed to the content of instructional offering, the authors identify procedures to promote acquisition and generalization of skills. Exemplified within a learning strategies model, the procedures outlined here stress acquisition of specific strategies through learning it in isolation and then applying it to controlled materials. The real effect of the instruction, however, is the degree to which the student can generalize the acquired strategy to the materials used in the regular classroom and to maintain the strategy over time. Specific procedures to promote generalization across settings and over time are identified and described. (Author/SB)

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INSTRUCTIONAL PRACTICES THAT PROMOTE ACQUISITION AND GENERALIZATION OF SKILLS BY LEARNING DISABLED ADOLESCENTS

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Cooperating Agencies

Were it not for the cooperation of many agencies in the public and private sector, the research efforts of The University of Kansas Institute for Research in Learning Disabilities could not be conducted. The Institute has maintained an on-going dialogue with participating school districts and agencies to give focus to the research questions and issues that we address as an Institute. We see this dialogue as a means of reducing the gap between research and practice. This communication also allows us to design procedures that: (a) protect the LD adolescent or young adult, (b) disrupt the on-going program as little as possible, and (c) provide appropriate research data.

The majority of our research to this time has been conducted in public school settings in both Kansas and Missouri. School districts in Kansas which are participating in various studies include: United School District (USD) 384, Blue Valley; USD 500, Kansas City; USD 469, Lansing; USD 497, Lawrence; USD 453, Leavenworth; USD 233, Olathe; USD 305, Salina; USD 450, Shawnee Heights; USD 512, Shawnee Mission, USD 464, Tonganoxie; USD 202, Turner; and USD 501, Topeka. Studies are also being conducted in Center School District and the New School for Human Education, Kansas City, Missouri; the School District of St. Joseph, St. Joseph, Missouri; Delta County, Colorado School District; Montrose County, Colorado School District; Elkhart Community Schools, Elkhart, Indiana; and Beaverton School District, Beaverton, Oregon. Many Child Service Demonstration Centers throughout the country have also contributed to our efforts.

Agencies currently participating in research in the juvenile justice system are the Overland Park, Kansas Youth Diversion Project and the Douglas, Johnson, and Leavenworth County, Kansas Juvenile Courts. Other agencies have participated in out-of-school studies--Achievement Place and Penn House of Lawrence, Kansas, Kansas State Industrial Reformatory, Hutchinson, Kansas; the U.S. Military; and the Job Corps. Numerous employers in the public and private sector have also aided us with studies in employment.

While the agencies mentioned above allowed us to contact individuals and supported our efforts, the cooperation of those individuals--LD adolescents and young adults; parents; professionals in education, the criminal justice system, the business community, and the military--have provided the valuable data for our research. This information will assist us in our research endeavors that have the potential of yielding greatest payoff for interventions with the LD adolescent and young adult.

ABSTRACT

While most efforts in programming for learning disabled adolescents have been directed to the content of instructional offering, the authors identify procedures to promote acquisition and generalization of skills. Exemplified within a learning strategies model, the procedures outlined here stress acquisition of specific strategies through learning it in isolation and then applying it to controlled materials. The real effect of the instruction, however, is the degree to which the student can generalize the acquired strategy to the materials used in the regular classroom and to maintain the strategy over time. Specific procedures to promote generalization across settings and over time are identified and described. The acquisition and generalization procedures presented herein are currently being investigated by The University of Kansas Institute for Research in Learning Disabilities.

The University of Kansas Institute for Research in Learning Disabilities is supported by a contract (#300-77-0494) with the Bureau of Education for the Handicapped, Department of Health, Education, and Welfare, U. S. Office of Education, through Title VI-G of Public Law 91-230. The University of Kansas Institute, a joint research effort involving the Department of Special Education and the Bureau of Child Research, has specified the learning disabled adolescent and young adult as the target population. The major responsibility of the Institute is to develop effective means of identifying learning disabled populations at the secondary level and to construct interventions that will have an effect upon school performance and life adjustment. Many areas of research have been designed to study the problems of LD adolescents and young adults in both school and non-school settings (e.g., employment, juvenile justice, military, etc.)

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INSTRUCTIONAL PRACTICES THAT PROMOTE ACQUISITION AND GENERALIZATION OF SKILLS BY LEARNING DISABLED ADOLESCENTS

During the past ten years there has been an increased amount of interest in programming options for adolescents with learning disabilities (Deshler, Lowrey, & Alley, 1979). Most questions raised by practitioners relate to "what" should be taught to these students in order to adequately prepare them for post school demands. While curriculum related questions are central to determining a successful instructional program for this group of students, there is another question that is equally as important. Specifically, "how" should LD adolescents be instructed so as to maximize the information learned (acquired) and generalized. Instructional practices that promote acquisition and generalization of skills are important to identify and implement regardless of the curriculum content.

The importance of focusing on specific instructional practices that promote acquisition and generalization has become increasingly apparent to the authors during their efforts over the past five years to develop a learning strategies model (Alley & Deshler, 1979). Initially, our efforts emphasized the development of a generalized methodology for teaching learning strategies[1] to LD students in the

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[1]Learning strategies are defined as techniques, principles, or rules that will facilitate the acquisiton, manipulation, integration, storage, and retrieval of information across situations and settings (p. 13). The goal of a learning strategy approach is to allow students to better cope with the demands of the secondary curricula and the demands of social interactions.

areas of reading, mathematics, writing, speaking, listening, thinking and social interactions. While the generalized methodology outlined positively affected the performance of students, it became obvious that there was a need to design a systematic set of procedures for improving the precision and effectiveness of teaching learning strategies to students. Two factors that most clearly underscored the need for the systematic and effective improvement when teaching learning strategies to LD adolescents were the following:

1. Instructional time with learning disabled adolescents is extremely limited because of placement in resource room settings and eminent graduation from high school.
2. Secondary students are expected to apply skills they learn across a broad array of settings, contents, and conditions. Demonstrating competence with a given skill only within a special class setting is not sufficient. Instead, the student is expected to apply given skills in a variety of situations. Such broad-ranged application and generalization does not occur by accident but must be deliberately planned in instruction.

The purpose of this article is to outline specific procedures that we have recently used and researched to promote acquisition and generalization of learning strategies with LD adolescents. While the discussion and examples throughout the remainder of this paper relate primarily to a learning strategies model of instruction, it

should be emphasized that these procedures represent the "how" of instruction and have application across different curriculum emphases with handicapped populations. The procedures described in the remainder of this paper have been drawn from two primary sources:

1. Our experience and observation in instructing LD adolescents, and
2. Information provided through the research and conceptualization of learning and cognitive psychology.

These procedures are currently the focus of the research being conducted by The University of Kansas Institute for Research in Learning Disabilities whose research mission is to study the LD adolescent and young adult.

Acquisition

The sequence of instructional steps discussed in this section has been developed in order to increase the effectiveness of the teaching strategies to LD adolescents. In the instructional steps outlined below, students are first taught a specific strategy in isolation before they are asked to apply it to controlled materials and later to transfer the strategy to regular class content.

Step 1: Analysis of Current Learning Habit. The student is first asked to perform a task which requires the target strategy or skill. At completion, the LD teacher affirms with the student in a positive, matter-of-fact manner that he/she either completed the task incorrectly or has a skill deficit. The purpose of this step is to

make the student aware of the inefficient or ineffective habit that he/she is currently practicing. This step is important in that it allows the student to understand his/her current practice so that he/she can clearly see the difference between the inefficient or ineffective approach and the instructional strategy that will be taught. During the instructional process, the teacher can repeatedly refer back to the student's "old" learning habit(s) that are to be modified or replaced with the "new" strategy. This step is particularly important to use with older students. They can readily see and understand the differences that exist between their current approach to a task and the new strategy. Making them aware of these discrepancies often serves to increase their involvement in the instructional process. Involving the student actively in the use of instructed strategies has been found to increase the strategy's durability (Wolff, Levin, & Longobard, 1974; Borkowski, Levers, & Gurenenfelder, 1976; Buium & Turnure, 1977; Turnure, Thurlow, Buium, & Davidson, 1977). The learning psychology literature suggests that the student can become actively involved in the acquisition process in a variety of ways. Regardless of the means, active involvement seems to work because it gives initiative in the use of the strategy to the person being instructed. It should be noted that most of the subsequent steps of this systematic acquisiton sequence attempt to actively involve the learner.

Step 2: Describe the New Strategy. The next step in the teaching process is to describe to the student the steps involved in the new strategy. These steps should include the major behaviors in which the student will sequentially engage to complete the strategy

correctly. For example, "First, you will read a paragraph. Then you will stop reading and ask yourself some questions. As you think of a question, you will answer it yourself or you will go back to the paragraph to find the answer. After you have answered all the questions you can think of, you will read the next paragraph...." As the steps are described by the teacher, it is very important to give a rationale for the strategy and for each step of the strategy. Giving the student the rationale of the strategy is more likely to increase motivation for learning the new strategy. When giving the strategy rationale, the teacher should carefully point out advantages of using the new strategy over the old practice. The explanation should not be a long lecture, but rather a short, concise explanation and should be related to the student's previous behavior. The teacher should encourage the student to ask questions during this explanation.

Step 3: Model the New Strategy. In this step, the LD teacher models for the student the strategy or skill in its entirety. Specifically, the teacher shows the student the entire strategy by demonstrating all of the steps described in Step 2 above while "thinking aloud" so the student can witness all of the processes involved in the strategy. Again, the student should be encouraged to ask questions to insure understanding of the teacher's demonstration of the strategy.

Step 4: Verbal Rehearsal of the Strategy's Steps. Before the student is asked to demonstrate the strategy, he/she must learn the steps of the strategy to an automatic level. The student should be asked to verbally rehearse the steps involved in the strategy. This process is designed to prompt the self-instructional process as the

student performs the strategy in the future. The aim should be to have the teacher's instruction in Steps 2 and 3 transferred to the student so that he/she will progress from overt verbal rehearsal to covert verbal rehearsal as he/she becomes proficient in the strategy. This step of verbal rehearsal basically involves a self-instructional training procedure that has been found to be central to the learning of higher order cognitive strategies. (Brown, 1978; Flavell, 1976; & Meichenbaum, 1975).

Step 5: Student Practices in Controlled Materials. As soon as the student demonstrates both an understanding and mastery of the steps or procedures involved in the strategy, the teacher should choose controlled materials (e.g. high-interest, low-vocabulary materials) for student practice. These materials are written on the student's reading level and are relatively content free. These attributes of the materials are necessary so that additional content demands, i.e., vocabulary and concepts, are reduced to permit the student to more easily learn the strategy. The major purpose of taking students out of their classroom materials at this point is to focus the learning on the use of the strategy with many repetitions (since chapters or sections in these controlled materials are relatively short) and to apply the strategy in materials that are conducive to learning the strategy without making additional content demands. It should be emphasized that a key component of this step is the repetition and practice required of the student. Acquisition of new strategies or skills is highly dependent on the number of practice or training sessions provided to the student. The literature is abundantly clear on the positive relationship of increased training

sessions or trials to acquisition (Gruenfelder & Borkowski, 1975; Borkowski & Cavanaugh, 1978; Turnure & Thurlow, 1973).

Step 6: Student Practice in Classroom Materials. Much of the work that is done with learning disabled students in resource rooms ignores the importance of teaching students specifically how to transfer skills learned in "special education" materials to the content requirements of the regular classroom. When no attention is given to the question of transfer, the student's performance usually decreases markedly once they are placed in the regular classroom. While the application of a given learning strategy to new settings and materials is in large part a generalization question, it is included in this step as well because we feel that generalization should be treated as a specific skill and care should be given to insure generalization during the acquisiton of a skill. The LD teacher should use the student's regular classroom materials for the purpose of teaching him/her the generalization of strategies and not for the purpose of tutoring the student to obtain content. For example, the history lesson is used to teach self-questioning skills mastery and not to teach mastery of the content. Although both are related, the emphasis of the teaching is different. This step embodies a very important aspect for promoting acquisition durability. Specifically, the teacher uses this step as an opportunity to fade the instructional prompts and cues that were liberally given in previous steps. Two of the most frequently cited explanations as to why fading is important are:

1. Fading reduces the student's discrimination between the training environment (resource room) and application environment (regular classroom).
2. Fading and the removing of prompts and cues leads the student to take more initiative and to become more active in the use of the strategy.

The artificial supports provided to the student in the resource setting are systematically removed during this step.

Concurrent Step: Corrective Feedback. An important process that is embodied in each of the steps described above is providing corrective feedback to the student. During all acquisiton steps, the teacher should give the student positive and corrective feedback and require that the student practice until he/she performs the skill to criterion with no prompts or cues from the teacher. Students should be encouraged to give the teacher verbal reports on their perception of their performance. These reports can be incorporated in the feedback provided by the teacher. There is ample evidence that acquisition of a strategy is promoted when the teacher provides explicit feedback on the relationship between the results achieved and the use of the strategy (Kennedy & Miller, 1976; Borkowski, Levers, & Gruenenfelder, 1976; Field, 1977).

Generalization

Little direct attention has been given to systematically promoting generalization of skills acquired during the instructional process with mildly handicapped students. The majority of planning and instructional time with LD adolescents in resource room settings is spent on the acquisition of specific skills or strategies. We are often satisfied that instruction has been successful if a student

demonstrates mastery at a given criterion within the resource room on special education materials. The real measure, however, of the effect of instruction delivered in the resource room is the degree to which the student can generalize the acquired strategy to the regular classroom when using regular class materials and then to maintain the strategy over time. While we want what we teach to carry over to other settings, conditions, and contents, we typically follow what Stokes and Baer (1977) termed a "train and hope" approach to generalization.

The need to generalize training acquired in special class settings is gaining acceptance, but many persons do not realize that generalization does not automatically occur because a strategy has been learned in one setting under one set of conditions. The need to systematically program and instruct for generalization requires the attention of both practitioners and researchers.

Stokes and Baer (1977) underscored the importance of systematically planning for generalization in instruction:

> ...behavioral research and practice should act as if there were no such animal as "free" generalization -- as if generalization never occurs "naturally," but always requires programming. Then, "programmed generalization" is essentially a redundant term, and should be descriptive only of the active regard of researchers and practitioners. (p. 365)

While the technology of teaching generalization is in an infant stage, there are some techniques that seem to promote the generalization of behaviors. The techniques discussed below have been adapted from Stokes and Baer's (1977) review of generalization procedures. In

their article, "An Implicit Technology of Generalization", Stokes and Baer suggested that these techniques represent the picture of generalization technology in its most pragmatic form. They are:

1. Teach LD Students to Cue Others for Reinforcement. This generalization technique requires the student himself/herself to take an active role in enhancing generalization of a skill. Having students cue others, particularly regular class teachers, for reinforcement is important because in many instances there are no natural reinforcers operating in the regular class to develop and maintain a skill. Given the demands placed on regular class teachers, it is often difficult for them to remember to reinforce the work of the LD student. An example of how this generalization technique might work is as follows. John, a 14-year old LD student, is expected to take notes during the teacher's lecture in history class and to relate these notes to materials in his history text. John lacks the necessary organizational and notetaking skills to meet this expectation. His placement in the resource room special materials and activities has been used to teach him organization and notetaking skills. As John gains in his facility in applying these skills under controlled conditions of the resource room, his LD teacher encourages him to apply them in his history class. He/she further instructs John to show his history teacher his notes when he thinks he has done a good job. In essence, John has been encouraged to

cue his teacher for reinforcement of his work by called his/her attention to his good work. Teaching students a means of recruiting reinforcement from a setting puts the student in a position of being an agent of his/her own behavior change rather than relying on random, if any, reinforcement. Such cueing initiatives by the student can promote generalization of skills when the student is not behaving under the watchful eye of the LD teacher. A modification to this technique is for the LD teacher to take a role in cueing the regular class teacher to reinforce a specific set of behaviors of the LD student in the regular class. The regular class teacher's attention can be directed to a given acquired strategy of the LD student to be reinforced in the regular class simply by such communication methods as placing brief notes in the regular classroom teacher's mailbox, making comments during class breaks or in teachers' lounge during work periods, etc.

2. Use Sufficient and Diverse Exemplars. A powerful tactic for increasing generalization is to incorporate sufficient examples within resource room instruction to give the LD student ample experience with a specific concept. Because of the many deficits older LD students display, there is often a great temptation to hurriedly teach a given strategy in order to move on to another deficit. While the instructional decision of teaching for depth versus breadth is a very difficult and complex one to make,

practitioners should not underestimate the importance of providing students with several examples, diversifying them as much as possible. This technique increases the probability of strategy maintainence and general applicability. An example of using sufficient and diverse examplars follows. Ron's LD teacher is teaching him a strategy for solving mathematics problems that helps him identify the key concepts, alternative solutions, and extraneous data. Intially, he/she uses simple problems in which the solutions and variables are readily apparent. After Ron acquires the process of applying the strategy to these simplified problems, his teacher begins to vary the types and complexity of problems. While Ron is still expected to apply the same basic strategy, he is now expected to use it within imbedded materials that present diversified demands on him. The use of sufficient and diverse examplars is often a time consuming generalization technique but it has been found to be a relatively powerful one. It is designed to make the instructional demands of the resource room setting as close to the demands of the regular class setting as possible. Without using sufficient and diverse examplars in instruction, we run the risk of teaching LD students transitory skills that have limited generalization to the regular class setting.

3. Train Loosely. On the surface this generalization technique seems to be a contradiction to what is generally regarded as sound instruction. While precision in teaching is a valued practice when a student is first learning a particular skill in order to insure consistent matching of the stimulus and the response to avoid confusion, generalization will be restricted if it is continued throughout the entire instructional sequence. In essence, the "train loosely" technique of generalization is an instructional tactic in which training is conducted with relatively little control over the stimuli or the responses. An example of the importance of this technique can be seen by reviewing many of the instructional kits designed to teach specific skills to LD students in resource settings. Many of these kits specify an exact format to be followed in all instructional activities. While consistency and structure are essential in the initial stages of acquiring a skill, formats, procedures, and examples should be varied as the student gains mastery in order to promote generalization. LD teachers should deliberately attempt to vary the formats and instructions given to students in order to approximate real learning situations as much as possible.

4. Use a Variety of Agents, Settings, and Conditions. In many respects, this generalization technique is one of the most difficult to operationalize within a secondary school because it involves many scheduling arrangements. It demands considerable administrative cooperation as well as creative management and organization by the LD teacher. In essence,

this generalization technique dictates that it is not an optimal instructional situation when the LD teacher is the only one who delivers the instruction. Instead, to maximize the generalization and maintenance of a given strategy, LD students should be taught the strategy in more than one setting by more than one teacher, using flexible grouping options. Each of these factors adds robustness to the recently acquired strategy. For example, peers may represent a highly suitable source of alternative "teachers" for LD adolescents. The importance of varying instructional agents has been underscored by Dyer (1978) who discussed the great danger of LD students becoming highly dependent on one LD teacher to the point of being unable to make instructional progress under other teachers. He cautioned that those in the "helping professions" must be very sensitive to the possibility of student becoming overly dependent on any one professional. One way to break this dependence is to involve more than one teacher in the instructional effort thus encouraging the student to concentrate on the content rather than the instructional agent. Similar arguments can be made for settings and grouping options.

5. Use Delayed and Intermittent Reinforcement. This generalization technique draws upon a well-established learning principle: intermittent schedules of reinforcement are particularly resistent to extinction. This principle makes this technique favorable to generalization of behaviors.

Behaviors generalize under conditions in which reinforcement schedules are varied just as behaviors are acquired under conditions where reinforcement is fixed. The key feature of using intermittent schedules for reinforcing students is their expectancy coupled with their unpredictability. Thus, LD teachers should schedule reinforcers for students so that the student expects reinforcement will occur but can not predict its occurrence. The common practice in many resource rooms of using every Friday for dispersing rewards to students may well lose some of its impact over time because of its highly predictable nature.

While discussing reinforcement schedules, it is important to carefully distinguish between reinforcement early in an acquisition sequence and reinforcement after the strategy has been acquired. In order to initiate behaviors and create a consistent stimuli-response match consistent reinforcement schedules may be most appropriate in order to promote acquisition of a skill. However, in order to promote its generalization and maintenance over time, a shift to intermittent or delayed schedules should be made.

6. Tell Students to Generalize. Perhaps the least expensive and certainly the most straight forward technique for promoting generalization of behaviors is simply to tell students to generalize what they have learned. For example, after instruction has been provided in the resource room on a given strategy, the student should be challenged or reminded to apply the specific strategy in his other classes during

the day. Too frequently, we assume that students will see the connection between what is taught in the resource room and what is demanded of them in the regular classroom. It should never be assumed that a student will realize that skills taught and practiced in the resource room are to be applied in other settings. Frequent reminders to "try-out" and "practice" what was taught in the resource room in different settings and with different contents can be very effective. The student's parents can help with this technique in order to assist generalization of strategies acquired at school that have relevance at home.

Conclusion

This article has outlined some procedures for facilitating the acquisition and generalization of skills by learning disabled adolescents. The steps and techniques discussed are currently being researched in depth at The University of Kansas Institute for Research in Learning Disabilities in order to determine more precisely the relative importance of each technique described above. We wish to underscore the large number of questions that remain to be answered concerning acquisition and generalization by handicapped populations. There is a tremendous need for practitioners and researchers to continually question and analyze current practices (including those outlined in this article) so that we can increase our understanding on how to more effectively teach those who have disorders in learning.

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